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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,775	10/20/2003	Ronald Chi-Chun Hui	20599.0003	9599
23517	7590	12/14/2005	EXAMINER	
SWIDLER BERLIN LLP 3000 K STREET, NW BOX IP WASHINGTON, DC 20007			KIM, DANIEL Y	
			ART UNIT	PAPER NUMBER
			2185	

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/687,775	HUI, RONALD CHI-CHUN	
	Examiner	Art Unit	
	Daniel Kim	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 15, 16, 30 and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15, line 3 discloses "three sequential operations performed in parallel".

This language does not allow one of ordinary skill in the art to determine the scope of the claimed invention. For purposes of this action, this limitation will be interpreted as multiple operations, performed sequentially, one after another.

Claim 15, line 3 discloses "three sequential operations performed in parallel".

This language does not allow one of ordinary skill in the art to determine the scope of the claimed invention. For purposes of this action, this limitation will be interpreted as multiple operations, performed sequentially, one after another.

Claim 30, line 3 discloses "three sequential operations performed in parallel".

This language does not allow one of ordinary skill in the art to determine the scope of the claimed invention. For purposes of this action, this limitation will be interpreted as multiple operations, performed sequentially, one after another.

Claim 31, line 3 discloses "three sequential operations performed in parallel".

This language does not allow one of ordinary skill in the art to determine the scope of

the claimed invention. For purposes of this action, this limitation will be interpreted as multiple operations, performed sequentially, one after another.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Bumbulis (US PGPub No. 20030204513).

For claim 1, Bumbulis discloses a content addressable memory for finding data associated with key data comprising: memory having a L level hierarchy for storing key entries in a sorted tree form where $L > 1$ and storing data associated with the key entries (binary trie in a database system, in which the keys or keywords are kept in a balanced tree structure and the lowest level of the tree points at the data records, abstract and par. 0024), an update block for inserting new key entries and associated data into the memory and deleting key entries and associated data from the memory while maintaining the sorted tree form of the key entries (a create submodule to create an index and an insert submodule for inserting an index entry, par. 0071), and at least one search block identifying a key entry and associated data that matches the key data

based on comparisons between the received key data and the key entries in the memory at each level of the hierarchy (a search submodule to find a particular key value in a tree, par. 0071).

For claim 2, Bumbulis discloses at least one search block comprises L search blocks, each search block corresponding to a memory level and wherein each search block returns an address value that identifies a subset of the next level of the memory for the search operation of the lower level search block until a matching entry or lack thereof is identified by the lowest level search block (given a key stored in a leaf, one can find the leaf by doing a blind search from the root node. If a node is encountered, the search continues on until a match is found, or not found, par. 0105).

Claim 17 is rejected using the same rationale as for the rejection of claim 1 above.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513) and Kempke et al (US Patent No. 5,930,359).

For claim 3, Bumbulis discloses the invention as per the rejection of claim 1 above. Bumbulis does not, however, expressly disclose the search blocks are arranged

as a pipeline to receive new key data for search and retrieval operations in successive memory cycles.

Kempke, however, discloses a cascade logic which updates its data in real time continuously. When the pipeline is full, a different data word exists in each stage. During each clock cycle, a data word enters the first stage as another exits the system. In this manner, a high speed data rate can be sustained, where a new multiple-stage-search-result is provided every clock cycle. Thus, an N-stage pipeline will take N clock cycles to fill the pipeline and give the first match output results (col. 5, lines 16-42).

Kempke and Bumbulis are analogous art in that they are of the same field of endeavor, that is, a system and method for database manipulation and management. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include a pipeline search block because in this manner, a high speed data rate can be sustained, where a new multiple-stage-search-result is provided every clock cycle, and provides zero variation latency and high speed communication (col. 5, lines 38-45), as taught by Kempke.

Claim 18 is rejected using the same rationale as for the rejection of claim 3 above.

7. Claims 4-5 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513) and Davis et al (US PGPub No. 20030023581).

For claim 4, Bumbulis discloses the invention as per the rejection of claim 1 above. Bumbulis does not, however, expressly disclose at least one search block is configured to determine an exact match.

Davis, however, discloses a high level flow chart for performing a longest prefix match search. A search of the main engine for the key is performed. Preferably, this step includes using the first sixteen bits of the key to locate a particular entry in the direct table, then using the remainder of the key, if necessary, to obtain either an exact match for the key or the longest prefix match for the key. This step could also include utilizing one of the trees, if any, attached to the particular entry. It is determined whether an exact match of the key or the longest prefix match for the key was found in the main engine. If so, the method terminates (par. 0027).

Davis and Bumbulis are analogous art in that they are of the same field of endeavor, that is, a system and method for database management. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include a search block configured to determine an exact match, because this would allow the system to find a longest prefix match for a key for specific data that is being forwarded using the system (par. 0026), as taught by Davis.

Claim 5 is rejected using the same rationale as for the rejection of claim 4 above.

Claim 19 is rejected using the same rationale as for the rejection of claim 4 above.

8. Claims 6 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513), Davis et al (US PGPub No. 20030023581) and Waters et al (US Patent No. 6,522,632).

For claim 6, the combined teachings of Bumbulis and Davis disclose the invention as per the rejection of claims 1 and 5 above. Bumbulis and Davis do not, however, expressly disclose the longest prefix match is determined based on masking the key data and key entries for different prefix lengths, determining when an exact match exists for different prefix lengths and selecting the longest exactly matching prefix.

Waters, however, discloses when key fields of an internal or leaf node are being read, the comparator performs a masked compare to compare just the bits of the stored prefix key to the search key. Masking is required because the variable length prefixes within the node may not be aligned to a 16-bit boundary and thus only part of the 16-bit word read from memory may contain the stored prefix. The remaining bits must be masked from the comparison. The results of the comparison are passed to the control logic to direct the search (col. 14, lines 47-56).

Waters, Bumbulis and Davis are analogous art in that they are of the same field of endeavor, that is, a system and method for database management, especially for the manipulation of prefix key pairs. It would have been obvious to a person of ordinary skill in the art at the time of the invention to allow longest prefix match to be determined based on masking the key data and key entries for different prefix lengths because

without masking, only parts of words read from memory may contain the stored prefix (col. 14, lines 50-53), as taught by Waters.

Claim 20 is rejected using the same rationale as for the rejection of claim 6 above.

Claim 21 is rejected using the same rationale as for the rejection of claim 6 above.

9. Claims 7 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513) and DeLong et al (US Patent No. 6,185,552).

For claim 7, Bumbulis discloses the invention as per the rejection of claim 1 above. Bumbulis does not, however, expressly disclose the memory includes rows of key entries arranged in order of key value.

DeLong, however, discloses data conversion tables having ordered index or key entries, each associated with a respective data entry or entries (col. 1, lines 7-9, fig. 1).

DeLong and Bumbulis are analogous art in that they are of the same field of endeavor, that is, a system and method for database management, especially for the manipulation of prefix key pairs. It would have been obvious to a person of ordinary skill in the art at the time of the invention to arrange rows of key entries in order of key value, because this would allow a search value to be compared to the key values in a specified order, making database searching more efficient and organized (col. 1, lines 17-21), as taught by DeLong.

Claim 22 is rejected using the same rationale as for the rejection of claim 7 above.

10. Claims 8-9 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513), DeLong et al (US Patent No. 6,185,552) and Stark et al (US PGPub No. 20030208657).

For claim 8, the combined teachings of Bumbulis and DeLong disclose the invention as per the rejection of claims 1 and 7 above. Bumbulis and DeLong do not, however, expressly disclose rows of key entries arranged in cyclical ascending order.

Stark, however, discloses key entries of an ordered key list are positioned contiguously in either an ascender or descending order in a multi-dimensional memory array (par. 0071).

Stark, Bumbulis and DeLong are analogous art in that they are of the same field of endeavor, that is, a system and method for database management, especially for the evaluation and searching of key values. It would have been obvious to a person of ordinary skill in the art at the time of the invention to arrange key entries in such an order so that at least a portion of the array is filled with valid entries, without blanks (par. 0005), as taught by Stark.

Claim 9 is rejected using the same rationale as for the rejection of claim 8 above.

Claim 23 is rejected using the same rationale as for the rejection of claim 8 above.

Claim 24 is rejected using the same rationale as for the rejection of claim 9 above.

11. Claims 10 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513), DeLong et al (US Patent No. 6,185,552) and Gold (US PGPub No. 20030212652).

For claim 10, the combined teachings of Bumbulis and DeLong disclose the invention as per the rejection of claims 1 and 7 above. Bumbulis and DeLong do not, however, expressly disclose pointers to a maximum and a minimum value of each memory row.

Gold, however, discloses an apparatus for determining at least one of a new maximum value or a new minimum value of elements in an arbitrarily sized sliding window and means for maintaining an array of pointers to the stored maximum values or the stored minimum values (par. 0014).

Gold, Bumbulis and DeLong are analogous art in that they are of the same field of endeavor, that is, a method for database management, especially for determining information about stored values. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include pointers to maximum and minimum values of each memory row, because this allows for comparing the maximum or minimum values of each of the rows or columns common to a sliding window, and calculating of new maximum or minimum values for greater database management (par. 0013), as taught by Gold.

Claim 25 is rejected using the same rationale as for the rejection of claim 10 above.

12. Claims 11-14 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513), DeLong et al (US Patent No. 6,185,552), Gold (US PGPub No. 20030212652) and Stark (US PGPub No. 20040049630).

For claim 11, the combined teachings of Bumbulis, DeLong and Gold disclose the invention as per the rejection of claim 10 above. Bumbulis, DeLong and Gold do not, however, expressly disclose the memory stores a node value for each row that represents each row as a key entry in a higher level of the memory hierarchy.

Stark, however, discloses keys in an array are arranged, each key in a separate cell, in rows, in a subsequent ascending or descending order. Each new row starts from the same edge column in the array, so that at least a portion of the array is filled without blanks with valid keys (par. 0018).

Stark, Bumbulis, DeLong and Gold are analogous art in that they are of the same field of endeavor, that is, a method for database management, especially for organizing and determining information about stored entries. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include a node value for each row that represents each row as a key entry in a higher level of the memory hierarchy because then at least a portion of the array is filled without blanks with valid keys (par. 0018), as taught by Stark.

For claim 12, Stark further discloses comparing the input key with each key stored in the edge column, which contains the highest value of each row (par. 0027).

For claim 13, Stark further discloses identifying the row in which the new key should be inserted and selecting that row, identifying the column in the selected row, after which, or before which, the new key should be inserted and selecting that column, thereby obtaining the indices of the insertion location. If the keys in that row are arranged in an ascending ordering, shifting by one position towards the subsequent location the content of each cell which contains a key greater than the input key, and in a descending order, shifting by one position towards the preceding location the content of each cell which contains a key smaller than the input key (par. 0037-0041).

For claim 14, Stark further discloses identifying the column in the located row, from which the key should be removed and selecting that column, thereby acquiring the index of that column. If the keys are arranged in an ascending order, shifting by one position towards the preceding location the content of each cell which contains a key greater than the input key, thereby filling without blanks that portion of the array with the keys, and overwriting the content of the cell that contains the key to be removed, and if the row is arranged in an descending order, shifting by one position towards the subsequent location the content of each cell which contains a key smaller than the input key, thereby filling without blanks that portion of the array with valid keys (par. 0045-0046).

Claim 26 is rejected using the same rationale as for the rejection of claim 11 above.

Claim 27 is rejected using the same rationale as for the rejection of claim 12 above.

Claim 28 is rejected using the same rationale as for the rejection of claim 13 above.

Claim 29 is rejected using the same rationale as for the rejection of claim 14 above.

13. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513), DeLong et al (US Patent No. 6,185,552), Gold (US PGPub No. 20030212652), Stark (US PGPub No. 20040049630) and Hsue (US Patent No. 6,026,012).

For claim 15, the combined teachings of Bumbulis, DeLong, Gold and Stark disclose the invention as per the rejection of claim 13 above. Bumbulis, DeLong and Gold do not, however, expressly disclose a dual port random access memory for key entry insertion in three sequential operations, performed one after another.

Hsue, however, discloses a dual port random access memory with a symmetric layout to enhance performance and packing density (col. 1, lines 51-53).

Hsue, Bumbulis, DeLong, Gold and Stark are analogous art in that they are of the same field of endeavor, that is, a system or method for memory manipulation. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a dual port random access memory for key entry insertion because this

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has a fast operation speed with a more powerful function of data input/output than a single port random access memory (col. 1, lines 30-32, 38-39), as taught by Hsue.

For claim 16, the combined teachings of Bumbulis, DeLong, Gold and Stark disclose the invention as per the rejection of claim 13 above. Bumbulis, DeLong and Gold do not, however, expressly disclose a dual port random access memory for key entry deletion in three sequential operations, performed one after another.

Hsue, however, discloses a dual port random access memory with a symmetric layout to enhance performance and packing density (col. 1, lines 51-53).

Hsue, Bumbulis, DeLong, Gold and Stark are analogous art in that they are of the same field of endeavor, that is, a system or method for memory manipulation. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a dual port random access memory for key entry insertion because this has a fast operation speed with a more powerful function of data input/output than a single port random access memory (col. 1, lines 30-32, 38-39), as taught by Hsue.

14. Claims ³⁰⁻³¹~~15-16~~ are rejected under 35 U.S.C. 103(a) as being unpatentable over Bumbulis (US PGPub No. 20030204513), DeLong et al (US Patent No. 6,185,552), Gold (US PGPub No. 20030212652), Stark (US PGPub No. 20040049630) and Hsue (US Patent No. 6,026,012).

For claim 30, the combined teachings of Bumbulis, DeLong, Gold and Stark disclose the invention as per the rejection of claim 28 above. Bumbulis, DeLong and

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Gold do not, however, expressly disclose a dual port random access memory for key entry insertion in three sequential operations, performed one after another.

Hsue, however, discloses a dual port random access memory with a symmetric layout to enhance performance and packing density (col. 1, lines 51-53).

Hsue, Bumbulis, DeLong, Gold and Stark are analogous art in that they are of the same field of endeavor, that is, a system or method for memory manipulation. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a dual port random access memory for key entry insertion because this has a fast operation speed with a more powerful function of data input/output than a single port random access memory (col. 1, lines 30-32, 38-39), as taught by Hsue.

For claim 31, the combined teachings of Bumbulis, DeLong, Gold and Stark disclose the invention as per the rejection of claim 29 above. Bumbulis, DeLong and Gold do not, however, expressly disclose a dual port random access memory for key entry insertion in three sequential operations, performed one after another.

Hsue, however, discloses a dual port random access memory with a symmetric layout to enhance performance and packing density (col. 1, lines 51-53).

Hsue, Bumbulis, DeLong, Gold and Stark are analogous art in that they are of the same field of endeavor, that is, a system or method for memory manipulation. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a dual port random access memory for key entry insertion because this has a fast operation speed with a more powerful function of data input/output than a single port random access memory (col. 1, lines 30-32, 38-39), as taught by Hsue.

Contact Information

15. Any inquiries concerning this action or earlier actions from the examiner should be directed to Daniel Kim, reachable at 571-272-2742, on Mon-Fri from 8:30am-5pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan, is also reachable at 571-272-4210.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information from published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. All questions regarding access to the Private PAIR system should be directed to the Electronic Business Center (EBC), reachable at 866-217-9197.

DK

12-9-05

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12/9/05

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